On the oblique Refraction of Iceland Crystal. By William Hyde Wollaston, *M.D. F.R.S.* Read June 24, 1802. [*Phil. Trans.* 1802, *p.* 381.]

In the preceding communication Dr. Wollaston inserted two different measures of refractive powers distinctly observable in the Iceland crystal, as well as an estimate of its dispersive power; but he has reserved for this treatise some remarks, which the same mode of investigation has enabled him to make on its oblique refraction. To this he was led by the consideration that the law to which Huygens had reduced this refraction, however founded in truth, could not be easily verified by any of the former methods of measurement.

According to the Huygenian hypothesis, light proceeding from any luminous centre is propagated by vibrations of a medium highly elastic, that pervades all space. In ordinary cases the incipient undulations are of a spherical form; but in the Iceland crystal they appeared to him to be portions of an oblate spheroid, of which the axis is parallel to the short diagonal of an equilateral piece of crystal, and its centre the point of incidence of the ray. Hence he deduced a ratio between the sine of incidence, and the sine of refraction (that is, the ordinate of the spheroidical undulation) in any section of the spheroid.

In a geometrical deduction our author shows that his observations on this substance accord throughout with the hypothesis of Huygens, the measures he has taken corresponding more nearly than could well happen in case of a false theory. This is illustrated by various examples, in which the refractive power is estimated according to various directions of the plane of incidence; and the data are pointed out for the construction of the spheroid, by which these refractions are regulated. Lastly, a comparative view of the angles observed, and those obtained by computation, is reduced into a table, from which, by their near agreement, we collect an additional proof of the accuracy of the results.

An Account of some Cases of the Production of Colours, not hitherto described. By Thomas Young, *M.D. F.R.S. F.L.S. Professor of Natural Philosophy in the Royal Institution.* Read July 1, 1802. [*Phil. Trans.* 1802, *p.* 387.]

In a former paper Dr. Young, treating of certain phænomena of coloured light, mentioned a law, according to which it appears, that whenever two portions of the same light arrive at the eye by different routes, either exactly or very nearly in the same direction, the light becomes most intense when the difference of the routes is any multiple of a certain length, and least intense in the intermediate state of the interfering portions, and that this length is different for light of different colours. In the same paper he showed the sufficiency of this law for explaining all the phænomena in the second and third books of Newton's Optics; and in the present communication he il-

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lustrates it still further, by applying it to some new distinct cases relating to the colours of fibres, and to the colours of mixed plates.

The case respecting fibres is that of the coloured fringes produced by the interposition of a hair between the luminous object and the eye. Here it is observed that the fringes are larger and brighter in proportion as the hair is thinner, the phænomenon being most conspicuous when a single thread of a silkworm is interposed. The cause here assigned is the interference of two portions of light, one reflected from the fibre, and the other bending round its opposite side, and at last coinciding nearly in direction with the former portion; hence as both portions deviate more from a rectilinear direction, the difference of the length of their paths will be gradually increased, and consequently produce the appearances of colour usual in such cases. The rule given to calculate the difference of the paths for the light least inflected, is the analogy between that difference to the diameter of the fibre, which will be as the deviation of the ray at any point from the rectilinear direction, to its distance from the fibre.

When a number of fibres of the same kind,—as, for instance, an uniform lock of wool,—are held near to the eye, we see an appearance of halos surrounding a distant candle; but their brilliancy, and even their existence, depends on the uniformity of the dimensions of the fibres, and they are larger as the fibres are smaller. To an effect similar to this are ascribed the coloured atmospherical halos, substituting to the above fibres a number of particles of water of equal dimensions, and properly situated between the luminary and the eye.

Speaking of the colours of mixed plates in looking at a candle through two pieces of plate-glass with a little moisture between them, we are told that the fringes here produced are the effect of moisture, intermixed with portions of air, exhibiting an appearance similar to dew. Here the light transmitted through the water, moving in it with a velocity different from that of the light passing through the interstices filled only with air, the two portions, it is said, will interfere with each other, and produce the effect of colours according to the general law.

In further applying this general law, the author found it impossible to avoid another supposition, which is a part of the undulatory theory he defended in his former paper; namely, that the velocity of light is the greater the rarer the medium: and he suggests an idea, which appears to him to lead to an explanation of the dispersion of colours by refraction, more simple and satisfactory than that which he formerly advanced. He supposes that every refractive medium transmits the undulations constituting light in two separate portions, one passing through its ultimate particles, and the other through its pores; and that these portions re-unite continually after each successive separation, the one having preceded the other by a very minute but constant interval, depending on the regular arrangement of the particles of a homogeneous medium. Having briefly discoursed on the application of this doctrine, he concludes by mentioning some observations which appear to him to confirm what he had advanced on a former occasion touching the dispersive powers of the eye.

On the Composition of Emery. By Smithson Tennant, *Esq. F.R.S.* Read July 1, 1802. [*Phil. Trans.* 1802, *p.* 398.]

The ultimate results of the experiments made on this substance, which it seems had never before been properly analysed, are—that 25 grains contain 12½ grains of argillaceous earth, 2 of silex, and 8 of iron; that 1 grain was not dissolved, and that the remainder, being 1½ grain, was lost in the process. Another process gave the same components, but in somewhat different proportions. These ingredients being very similar to those found by Mr. Klaproth in Diamond spar, it is thought that emery is essentially a substance of the same nature, with perhaps a somewhat greater proportion of iron.

Quelques Remarques sur la Chaleur, et sur l'Action des Corps qui l'interceptent. Par P. Prevost, *Professeur de Philosophie à Genève, &c. Communicated by* Thomas Young, *M.D. F.R.S.* Read July 1, 1802. [*Phil. Trans.* 1802, *p.* 403.]

The remarks here brought forward relate chiefly to Dr. Herschel's experiments on the solar and terrestrial rays that occasion heat, published in the Philosophical Transactions for the year 1800, and are meant to rectify some anomalies which appear in their results. The paper consists of two parts: the first being the observations on Dr. Herschel's experiments, and some new ones, with inferences deduced from them; and the second the exposition of a theory, which the author thinks may reconcile all contradictions.

In the first part he sets out with briefly stating the manner in which Dr. Herschel conducted the experiments he made, in order to estimate, by the indications of different thermometers, the quantity of heat transmitted through various substances, compared with the heat afforded by direct rays from different luminous bodies, or more properly sources of heat. Here the author soon starts a difficulty concerning the mode of estimating the intercepting power of the substances used in the experiments. As these experiments consist of a series of observations made progressively at intervals of one minute between each other, it follows that the ratio Dr. Herschel adopted between the heat produced by direct rays, and those transmitted through coloured media, is not, as he imagined, a constant proportion, he having uniformly deduced his inferences from the differences between the initial and the final degrees of heat; whereas, had he attended to the intermediate observations, he would have found that each of them would have afforded a different ratio.

Having maturely considered this subject, the author, adverting to this circumstance of the various proportions of heat progressively yielded in these experiments, observes, that it can hardly be conceived why the faculty of transmitting and intercepting heat should